

In the Specification:

[0024] FIGS. 1 and 2 show a first embodiment of an arrangement 1 for controlling a welding operation configured according to the teachings of the present invention. The control arrangement 1 comprises a device 2 for monitoring, or supervising, a welding area of an object 14. The device 2 comprises means 3 for reproduction of the welding area, which means 3 consists of a camera, a band-pass filter 4 arranged in front of a lens 15 of the camera, and means 5 for direct illumination of the welding area with ultraviolet radiation. The reproduction means 3 and the illumination means 5 are arranged on the same side of a welding means 7, in the form of a welding robot, and more specifically behind the melt 22 in the welding direction. As illustrated, the means 3 for reproduction of the welding area is situated such that the view of the welding area which it obtains – in this case, a direct view – is oriented at an oblique angle relative to the axis of the welding means 7. The object 14 can consist of, for example, two plates to be welded together.

[0026] As illustrated, the [[The]] illumination means 5 exemplarily consists of a nozzle or outlet for the illumination that is coupled to a UV radiation source 12 via an optical light guide, such as a fiber conductor 13, and is adapted for illumination – direct illumination in this embodiment – of the welding area at a suitable angle.

[0034] By supplying ultraviolet radiation in combination with narrow-band filtering, it is possible to obtain homogeneous exposure of the image with improved image quality in relation to known systems for such purposes. An additional effect of the combination of ultraviolet illumination and simultaneous filtering is that the majority of the ultraviolet radiation from the arc and the melt is filtered out. This affords opportunities for looking straight (i.e., directly) into the melt at the welding electrode (in combination with an attenuating filter) without the radiation from the melt saturating the camera. This makes it possible to measure the geometrical extent of the melt, and therefore the weld width. A further effect of the exposure to ultraviolet light is that the contrast and wealth of detail in the image of the melt and the solidification area are increased considerably.

[0037] According to an alternative, or complement, to the weld-width measurement described, it is also possible to use the arrangement for joint-tracking. According to a first variant of the first embodiment, the arrangement is used only for joint-tracking. In this application, the camera for joint-tracking is mounted in front of the welding head in its intended direction of movement and looks straight (i.e., directly) in toward the welding area, as illustrated. The illumination means is arranged on the same side of the welding area as the camera; that is to say, in front of the welding area. According to a second variant of the first embodiment, the weld-width measurement is carried out in combination with joint-tracking. The arrangement is then used with the relative positioning of the camera and the illumination means according to the first variant. It is thus possible to detect in one and the same image the joint and a front portion of the melt. By measuring the position of the joint in the image and comparing this with the position of the melt, it would be possible in real time, with an image-processing system, to control the weld so that it follows the joint. The method could also be used for measuring the gap between the plates to be welded in direct proximity to the melt.

[0049] In this example, the camera 3 and the illumination means 5 are arranged so that they extend essentially vertically; that is to say, essentially at right angles to the surface and parallel to the welding head 7. The UV light is therefore emitted vertically downward from the illumination means. A first mirror 20 is arranged under the illumination means 5 and is inclined at a suitable angle, preferably the same as or close to the angle of the first mirror so as to reflect to the camera the UV illumination reflected by the welding area. In a corresponding way, a second mirror 21 is arranged under the camera 3 and is inclined at a suitable angle so as to reflect to the camera the UV illumination reflected by the welding area. Despite the fact that the camera 3 extends vertically, i.e., essentially at a right angle to the surface and parallel to the welding head 7, its overall relative arrangement – with the second mirror 21 being located in front of it and at an appropriate angle relative to both the axis of the camera 3 and the surface – allows the camera 3 to obtain a reflected view of the welding area that is oriented at an oblique angle relative to the axis of the welding head 7 and relative to the surface, as illustrated. Thus,

this [[This]] second embodiment, where the camera 3 and the illumination means are arranged next to and along the welding head 7, affords opportunities for a relatively compact device.

[0058] FIG. 6 shows a fifth embodiment of the invention. The difference in this embodiment in relation to the third embodiment is that the illumination means 5 and the camera 3 are arranged on different sides of the joint to be welded. The camera 3 is therefore arranged so that it looks in toward the joint (directly, in this embodiment) from the side, essentially at 90° to the welding direction. The illumination means 5 is arranged on the opposite side of the joint, essentially at 90° to the welding direction, for illumination of the welding area (directly, in this embodiment) from the side. The welding means 7 is intended to be moved forward; that is to say, upward in the [[Fig]] figure. The light guide 5 and the camera 3 remain on different sides of the welding area during welding. In this way it is possible to obtain information about the length of the melt and a certain idea of the shape of the melt.